



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/768,182	02/02/2004	Hiroshi Nagasawa	NAGASAWA10	3666
1444 7590 11/29/2007 BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			EXAMINER BRUENJES, CHRISTOPHER P	
			ART UNIT 1794	PAPER NUMBER
			MAIL DATE 11/29/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/768,182	<b>Applicant(s)</b> NAGASAWA, HIROSHI	
	<b>Examiner</b> Christopher P. Bruenjes	<b>Art Unit</b> 1794	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 October 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-9 and 13-17 is/are pending in the application.
- 4a) Of the above claim(s) 8 and 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,7 and 13-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***WITHDRAWN REJECTIONS***

1. The 35 U.S.C. 102 rejections of claims 1-3, 6-7, 13, and 15-17 as anticipated by Kang et al of record in the Office Action mailed April 13, 2007, Pages 2-4 Paragraph 3, have been withdrawn due to Applicant's amendments in the Paper filed October 12, 2007.

2. The 35 U.S.C. 103 rejections of claims 4 and 14 over Kang et al in view of Kwasniewski et al of record in the Office Action mailed April 13, 2007, Pages 5-6 Paragraph 6, have been withdrawn due to Applicant's amendments in the Paper filed October 12, 2007.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-4, 6-7, and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schnabel et al (USPN 4,780,369).

Regarding claims 1-3, Schnabel et al teach an ionic conductor such as an ion exchanger membrane (col.1, l.14-21). The conductor comprises a porous glass body (col.3, l.8-10). The porous body has a plurality of continuous pores passing through said body because the pores are used to transport ions. Note diaphragm is given its broadest reasonable interpretation in light of the specification, which is a dividing membrane. The ion exchange membrane of Schnabel et al is a dividing membrane in that it selectively prevents material other than ions to pass through the membrane, so the membrane of Schnabel et al is a diaphragm. Schnabel et al further teach that functional groups are attached to the surfaces of the continuous pores (col.12, l.14-25). Note "all of the surfaces of said continuous pores" is given its broadest reasonable interpretation in light of the specification and would include pores with functional groups that are attached to every surface including surfaces inside the pores and on the edge of the pores. The limitation is not limited to pores have functional groups so that there is no surface not entirely covered by functional groups because this would be contrary to Applicant's specification which defines the functional groups as merely being attached to surfaces of the continuous pores. Schnabel et al teach that the functional groups include hydrophobic groups and hydrophilic groups such as sulfonates, which are ionizable functional groups.

Schnabel et al fail to explicitly teach that the hydrophobic groups of alkyl groups and the hydrophilic groups of ionizable functional groups such as sulfonates are attached to the pores at the same time. However, it would have been obvious to one having ordinary skill in the art at

the time Applicant's invention was made that the ion exchange membrane would not only require the sulfonate functional group since it is ionizable, but it would also be beneficial for the pores to contain hydrophobic groups such as alkyl groups in order to prevent the liquid in the cathode and anode from passing through the ion exchange conductor membrane.

Thus, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention made to attach both the ionizable functional groups and hydrophobic groups taught by Schnabel et al to the continuous pores of the porous body of Schnabel et al since the ionizable functional groups would allow the ions to move through the pores and the hydrophobic groups would prevent the liquid from the cathode and anodes to pass through the pores, and both are characteristics desired for an ion exchange membrane, as taught by Schnabel et al.

Regarding claims 4 and 14, the average diameter of the continuous pores is in the range of 11 angstroms, which is 1.1nm, to 1000 angstroms, which is 100nm (col.4, 1.54-60). The porosity of the porous body is obviously within the broad range of 5 to 90% since the material is as an ion exchange membrane.

Regarding claim 6, the hydrophobic group is an alkyl group.

Regarding claim 7, the porous body is a hollow fiber (col.12, 1.14), wherein a hollow fiber has a pipe shape.

Regarding claim 13, quaternary ammonium compound is a surface active agent (col.12, 1.42-53).

Regarding claim 15, the plurality of continuous pores extend from a surface to an opposite surface because the pores are used to transport ions across the membrane.

Regarding claims 16 and 17, the ionizable functional groups are sulphonic acid or  $\text{SO}_3^-$ ; or amino formed from quaternary ammonium compound or  $\text{N}^+(\text{CH}_3)_3$  (col.12, l.42-53).

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schnabel et al as applied to claim 1 above, and further in view of Kang et al (US 2002/0162456 A1).

Schnabel et al teach all that is claimed in claim 1 as shown above, but fail to teach that the ionizable functional groups are found on surface active agents. However, Kang et al teach that ionizable functional groups such as sulphonates are bonded to the pores by being part of a surface active agent such as an alkylbenzene sulfonate salt.

Therefore, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to use surface active agents in bonding to the pores of Schnabel et al to provide the pores the ionizable functional groups because it is a known way to accomplish that desire and surface active agents further provide stabilizations for the polymer electrolyte and helps maintain activity of the metal salt, as taught by Kang et al (p.2, paragraph 21).

### ***Response to Arguments***

7. Applicant's arguments filed October 12, 2007 have been fully considered but they are not persuasive.

In response to Applicant's argument that Schnabel et al does not teach that ionizable functional groups can be attached to the entire surfaces of the pores, the limitation "attached to all of the surfaces" does not mean attached to the entire surfaces of the pores. Something can be

attached to all surfaces without covering the entire surfaces. For example, the ionizable functional groups can attach to the end surface and inside surface of the pores and be connected to all surfaces but not cover the entire surface of each surface. Note further that Applicant's specification does not give written description support for ionizable functional groups attached to the entire surfaces of the pores only that it attaches to the pores including the inner surfaces of the pores. In the same manner, Schnabel et al teach that the ionizable functional groups are attached to surfaces of the pores even if it does not explicitly teach that the groups are attached to the entire surfaces of the pores.

### *Conclusion*

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Application/Control Number:  
10/768,182  
Art Unit: 1794

Page 7

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher P. Bruenjes whose telephone number is 571-272-1489. The examiner can normally be reached on Monday thru Friday from 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on 571-272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Christopher P Bruenjes  
Examiner  
Art Unit 1794

CPB *CPB*  
November 26, 2007

*Alic Chevalier*  
ALIC CHEVALIER  
PRIMARY EXAMINER